

## STS 123 Return Samples: Assessment of Air Quality aboard the Shuttle (STS-123) and International Space Station (1J/A)

The toxicological assessment of 1 grab sample canister (GSC) from the Shuttle is reported in Table 1. The end-of-mission sample was not properly acquired. Analytical methods have not changed from earlier reports. The recoveries of the 3 surrogates (<sup>13</sup>C-acetone, fluorobenzene, and chlorobenzene) from the GSC were 113, 110, and 102%. The Shuttle atmosphere was acceptable for human respiration based on historical data from earlier missions.

Table 1. Analytical Summary of Shuttle Samples

Sample Location	Date of Sample	NMVOCs <sup>a</sup> (mg/m <sup>3</sup> )	T Value <sup>b</sup> (units)	Alcohols (mg/m <sup>3</sup> )	Formaldehyde (µg/m <sup>3</sup> )
Flight deck (preflight)	3/10/08	0.3	0.03	0.1	--

<sup>a</sup> Non-methane volatile organic hydrocarbons.

<sup>b</sup> Calculated excluding CO<sub>2</sub>, formaldehyde, and siloxanes.

The toxicological assessment of 3 GSCs from the ISS is shown in Table 2. Formaldehyde badges were not returned. The recoveries from the 3 standards (as listed above) from the GSCs averaged 97, 91 and 92%, respectively. Episodically during the mission the crew reported symptoms consistent with excess exposure to carbon dioxide. During one event, near MET 1.1, the CO<sub>2</sub> concentration reached 7.2 mmHg (eclssmer data).

Table 2. Analytical Summary of ISS Results (previously reported values are in gray)

Module/Sample	Approx. Date	NMVOCs <sup>a</sup> (mg/m <sup>3</sup> )	T Value <sup>b</sup> (units)	Alcohols (mg/m <sup>3</sup> )	Formaldehyde (µg/m <sup>3</sup> )
Lab	2/25/08	5	0.16	4.4	--
Columbus	2/25/08	6	0.19	4.5	--
JLP [first entry]	3/14/08	18	0.80	7.9	--
<i>Guideline</i>		<25	<1.0	<5	<120

<sup>a</sup> Non-methane volatile organic hydrocarbons.

<sup>b</sup> Calculated excluding CO<sub>2</sub>, formaldehyde, and siloxanes.

A third sample taken on 2/25/08 in the Service Module was invalid due to a leak in the canister. The first-entry sample is typical of new modules that have been sealed for some time. Trimethylsilanol, a common product of materials offgassing, was the major component found when the crew entered the JLP module on orbit. The nominal air quality continues to be acceptable for respiration based on limited samples.

John T. James, Ph.D.  
Chief Toxicologist

### Enclosures

Table 1A: [Analytical concentrations of compounds found in the STS-123 GSCs](#)

Table 1B: [Analytical concentrations of compounds found in 1J/A GSCs](#)

Table 2A: [T-values of the compounds in table 1A](#)

Table 2B: [T-values of the compounds in table 1B](#)